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(54) METHOD AND DEVICE FOR UPDATING ELECTRONIC PROGRAM GUIDE INFORMATION IN DIGITAL TELEVISION RECEIVERS

(57) Abstract

A. Technical field of the invention disclosed in the claims

Relates to a method and device for updating electronic program guide information in a digital television receiver.

B. Problem to be solved by the invention

A method and device are disclosed for rapidly updating electronic program guide information so that a digital television receiver is always able to display updated and accurate stored electronic program guide information for all channels.

C. Summary of the solution of the invention

In standby mode, at each predetermined time, the power is switched on and channels are searched, so that the electronic program guide information for each channel is received; after updating, the unit returns to standby mode.

D. Important applications of the invention

The invention is used to update electronic program guide information in a digital television receiver.

Representative figure:

Figure 2

Specification

Brief explanation of figures

Figure 1 is a block diagram of an HDTV receiver according to the embodiment of the present invention, and

Figure 2 is a process flow chart according to an embodiment of the present invention.

Detailed description

Objective of the invention

Technology to which the invention belongs and prior art of the field

The present invention relates to a digital television (hereinafter "TV") receiver, and specifically to a method and device for updating electronic program guide (hereinafter "EPG") information.

For HDTV (high-definition television) and other next-generation digital broadcasts, the necessary bit rate for the required service can flexibly be assigned as needed. In other words, it is possible to transmit a plurality of programs in a single RF (Radio Frequency) channel within a limited transmission bandwidth. For example, it is possible for one time slot in the program schedule to assign SDTV (standard definition television) programming to a plurality of channels, and for another time slot to assign HDTV programming to 1 channel. This concept, known as ISDB (integrated services digital broadcasting) is referenced as the basic concept of digital broadcasting by international conferences including the ITU-R (International Telecommunication Union – Radiocommunication sector).

Accordingly there is a need for digital broadcasts to display program guides on the TV receiver screen so that the user watching a TV broadcast can select one of several programs. To this end, digital broadcasts such as US HDTV adopt a method of specifying and using a unique EPG for program selection. In other words, the broadcast station sends EPG information on each RF channel, and the TV receiver receives and stores the EPG information; when the user requests this information, it is displayed on the screen. Examples of such EPGs include the US ATSC (United States Advanced Television System Committee) standard.

This EPG information is received by a digital TV receiver with the power on, via the channel currently being viewed, i.e., the currently selected channel; if new information that differs from the EPG information that has been received and stored is available for this channel, it is updated with the newly received EPG information.

However, there is a high likelihood of the broadcast station sending only its own EPG information, and also of the user watching only certain channels for a long period of time. In these cases, since it is not possible to update EPG information for the unwatched channels, when EPG information for these other channels changes, the TV receiver will have inaccurately stored

EPG information. Thus, the EPG information provided to the user for unwatched channels will not be current. In addition, since frequently the TV receiver is left in standby mode for a long period of time with the power off, when it is turned on, the EPG information must be updated for all auto-programmed channels being searched by the automatic channel search function, which takes a long time to complete.

It should be noted that, typically, TV receivers have an automatic channel search function that automatically programs only the channels that can be received by searching for and storing these channels.

#### Problem of the invention

As explained above, EPG information can be kept current for channels being viewed; for channels that have not been viewed, and that send their own EPG information, the EPG information provided to the user will not be current. In addition, when the TV is turned on from standby mode, much time is needed for the EPG information to be provided to the user.

Thus, the objective of the present invention is to provide a method and device for updating EPG information whereby a digital TV receiver can rapidly update and continuously maintain accurate EPG information for all channels.

#### Constitution and operation of the invention

To realize the above-described objective, the present invention provides a method and device with which a digital TV receiver can be turned on from standby mode at certain time intervals and the channels searched, so that electronic program guide information for each channel is received, and after updating, the TV is returned to standby mode.

A detailed explanation of a preferred embodiment of the present invention is provided below with reference to the attached figures. In the descriptions and attached figures below, many specific details such as process flow are shown in order to provide a more comprehensive understanding of the present invention. The fact that the present invention can be implemented without these specific details will be obvious to a person of ordinary skill in the art. In addition, the detailed description of well-known functions and systems that may unnecessarily obscure the understanding of the present invention have been omitted.

Figure 1 shows a block diagram of an HDTV receiver that uses the MPEG (Moving Picture Expert Group) standard, as an example of a digital TV receiver according to the embodiment of the present invention. In said Figure 1, the tuner (102) inputs a broadcast reception signal via the antenna (100) so as to select the RF channel under the control of the microprocessor (124). Accordingly, in the tuner (102), an IF (Intermediate Frequency) signal is output according to the channel, is converted into a baseband signal by the IF module (104), and

output to the channel decoder (106). The channel decoder (106) performs channel decoding on the baseband signal input from the IF module (104) so as to reproduce the data bit sequence. The TS (transport stream) decoder (108) separates the audio data, video data and supplemental data from the data bit sequence reproduced by the channel decoder (106). The TS decoder (108) then separates the audio data and video data for the program selected by the microprocessor (124) from among the programs received through the RF channel.

Said audio data is conveyed to the audio decoder (110) for decoding according to the MPEG standard, and after processing by the audio processing and output part (112), is output as sound via the speaker (114). In addition, the video data is conveyed to the video decoder (116) for decoding according to the MPEG standard and is conveyed to the OSG (On-Screen Graphic) mixer (118) and blended with the OSG data controlled by the microprocessor (124), and after processing by the video processing and output part (120), is output to the screen via the receiver tube (122). Here the OSG data are used by the microprocessor (124) for displaying various types of information in the form of graphics or text on the screen.

In addition, the keypad (130) and IR (infrared) receiving part (134) are connected to the microprocessor (124), which is the control part of the HDTV receiver, via the user interface (128). The microprocessor (124) performs the actions specified by the commands input from the IR remote (132) via the keypad (130) or IR receiving part (134), according to the program stored in the memory part (126). Said IR remote (132) may be a remote controller (REMOCON) on a wireless mouse such as an air mouse. The commands conveyed from the IR remote (132) are received as IR signals by the IR receiving part (134) and conveyed to the microprocessor (124) via the user interface (128). In addition, the supplemental data is conveyed from the TS decoder (108) to the microprocessor (124); this supplemental data includes the above-described EPG information.

In addition, the memory part (126) is furnished with a ROM (Read-Only Memory) for storing the programs of the microprocessor (124), a RAM (Random-Access Memory) for temporarily storing data from the execution of the programs of the microprocessor (124), EEPROM (electrically erasable and programmable ROM) for storing various reference data, etc.

The above-described tuner (102), IF module (104), channel decoder (106), TS decoder (108), audio decoder (110), audio processing and output part (112), video decoder (116), OSG mixer (118), video processing and output part (120), and memory part (126) are connected via the bus (138) attached to the microprocessor (124).

The power device (136) supplies operating electrical power to the various component shown in Figure 1 under the control of the microprocessor (124); typically, the operating power can be broadly divided into the main power required for ordinary operations and the auxiliary power required to operate only a certain part. However, in the present invention, the auxiliary

power employs the ordinary standby power for operating only the necessary parts in standby mode, and separate and additional EPG update power. Said standby power is the minimum power required for operations such as detecting user key inputs with the TV receiver turned off; it operates only the microprocessor (124), memory part (126), user interface (128), keypad (130), and IR receiving part (134). In addition, the EPG update power additionally used by the present invention, as described below, is the power that is supplied only to the parts necessary for receiving and updating EPG information. The parts necessary for receiving and updating EPG information include, in addition to the parts to which standby power is supplied, the tuner (102), IF module (104), channel decoder (106), and TS decoder (108). Because this separation and supply of electrical power in various forms is well-known in the technical field of the present invention, its detailed description is omitted.

Figure 2 shows the flow chart of the processes of the present invention according to the embodiment; shown are the process for powering on from standby mode at certain intervals; the process for searching channels and receiving and updating EPG information for each channel; and the process for returning to standby mode after updating the EPG information. The program for the operations according to the flow chart of Figure 2 are stored in the ROM of the memory part (126) for execution by the microprocessor (124) of said Figure 1.

The operation according to the embodiment of the present invention will be described in detail with reference to said Figures 1 and 2. First, when the main power to the TV receiver is switched off and the receiver enters standby mode, so that only standby power is supplied, the microprocessor (124) switches on the EPG update power of the power device (136) at step (204) whenever the update period is exceeded while executing standby mode in steps (200)–(202) of Figure 2. Accordingly, the tuner (102), IF module (104), channel decoder (106) and TS decoder (108) enter the operating mode. In addition, the update period is a certain time interval for periodically updating EPG information in standby mode according to the present invention; it can be set to a default value or be specified by the user.

In this way, when EPG update power is supplied, the microprocessor (124), as described above, receives and updates EPG information for each channel while searching the automatically programmed channels in step (206). The receiving and updating of EPG information for each channel by the microprocessor (124) occurs in the same way as described above. In other words, the microprocessor (124) controls the tuner (102) so that it searches the channels in sequence one at a time, and the EPG information included in the supplemental data conveyed from the TS decoder (108) is compared with the EPG information previously stored in the memory part (126); if they differ, the EPG information is updated. In the present invention, the EPG information is then stored in a nonvolatile memory device, namely the EEPROM of the memory

part (126). In this case, even if the power to the TV receiver is completely switched off, the EPG information is not lost but is retained.

Once the EPG information has been updated for all channels, the microprocessor (124) switches off the EPG update power of the power device (136) in step (208), and returns to said (200) standby mode; when the next update period elapses, the above-described process is repeated.

Accordingly, by repeatedly periodically updating the EPG information for all channels from standby mode, the EPG information for all channels can be rapidly updated and maintained to be continuously accurate. Accordingly, it is possible to provide continuously accurate EPG information to the user for all channels regardless of whether they are currently being viewed; even when powering on from the off mode, the EPG information can be immediately provided to the user.

Although the foregoing description of the present invention pertained to a specific embodiment, it is possible to implement various modifications without departing from the scope of the present invention. Specifically, although the embodiment of the present invention discussed an example in which the present invention was applied to an HDTV receiver, it can also be applied identically to any digital TV receiver that uses an EPG. In addition, although the example was presented of using an EEPROM as the nonvolatile memory device in which the EPG information is stored, other memory devices can be used, as required, such as flash memory or a hard disk drive. In addition, although the example of automatically searching programmed channels in order to update EPG information was discussed, it is also possible to update EPG information by searching only those channels desired by the user. Accordingly, the scope of the present invention is not restricted by the embodiment described, but is defined solely by the claims.

#### Effect of the invention

As described above, the present invention has the advantage that a digital TV receiver can provide the user always accurate EPG information for all channels, which is stored and rapidly updated.

#### Claims

1. A method for updating electronic program guide information in a digital television receiver, provided with a process for powering on from standby mode at a certain time interval; a process for receiving and updating said electronic program guide information for each channel by searching channels; and a process for returning to said standby mode after updating said electronic program guide information.

2. The electronic program guide updating method of Claim 1, wherein said powering-on process involves the switching on of power supplied only to those portions that are necessary for receiving and updating said electronic program guide information.

3. The electronic program guide information updating method of Claim 1 or 2, wherein the searched channels of said updating process are channels set by the user.

4. The electronic program guide information updating method of Claim 1 or 2, wherein the searched channels of said updating process are channels for which broadcasts are received that have been automatically programmed by an automatic channel search.

5. A device for updating electronic program guide information in a digital television receiver, furnished with a tuner that selects the channel; first and second IF modules that convert the IF signal output from said tuner according to the selection to a baseband signal; a channel decoder that performs channel decoding of signal output from said tuner and reproduces a data bit sequence; a TS decoder that separates audio data, video data, and supplemental data from the data bit sequence reproduced by said channel decoder; a memory part that stores said electronic program guide information; a power device that separately generates power for updating electronic program guide information for supply only to said tuner, IF module, channel decoder and TS decoder, separately from the main power and standby power; and a control part that additionally switches on the electronic program guide information updating power of said power device at a certain time interval in standby mode, searches channels by said tuner and checks said electronic program guide information received through each channel from the supplemental data of said TS decoder so as to update said memory part, then returns to said standby mode.

6. The device for updating electronic program guide information of Claim 5, wherein said control part stores said electronic program guide information in a nonvolatile memory device in said memory part.

7. The device for updating electronic program guide information of Claim 5, wherein said control part is a microprocessor that acts as the main control device of said digital television receiver.

8. The device for updating electronic program guide information of Claim 5 or 7, wherein said channels searched by said control part are channels set by the user.

9. The device for updating electronic program guide information of Claim 5 or 7, wherein when said control part searches said channels, the channels searched are the channels that are received as broadcasts and that have been automatically programmed by an automatic channel search.



## Drawings

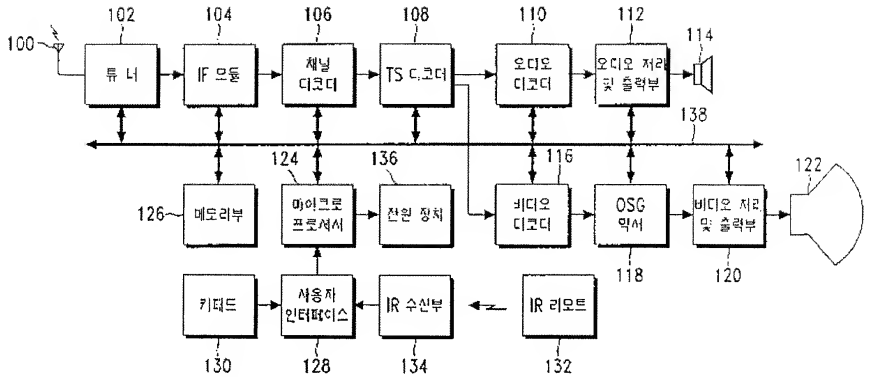


Figure 1

- Key:
- 102 Tuner
  - 104 IF module
  - 106 Channel decoder
  - 108 TS decoder
  - 110 Audio decoder
  - 112 Audio processing and output part
  - 116 Video decoder
  - 118 OSG mixer
  - 120 Video processing and output part
  - 124 Microprocessor
  - 126 Memory part
  - 128 User interface
  - 130 Keypad
  - 132 IR remote
  - 134 IR receiving part
  - 136 Power device

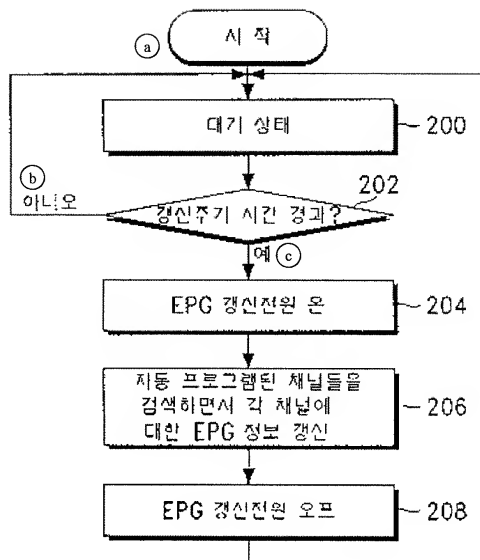


Figure 2

- Key: a Start  
 b No  
 c Yes  
 200 Standby mode  
 202 Has the update period elapsed?  
 204 EPG update power on  
 206 Update EPG information for each channel while searching automatically  
 programmed channels  
 208 EPG update power off